

Vertical Stretches

Graph the parent function $f(x) = \sin x$ for 3 full cycles

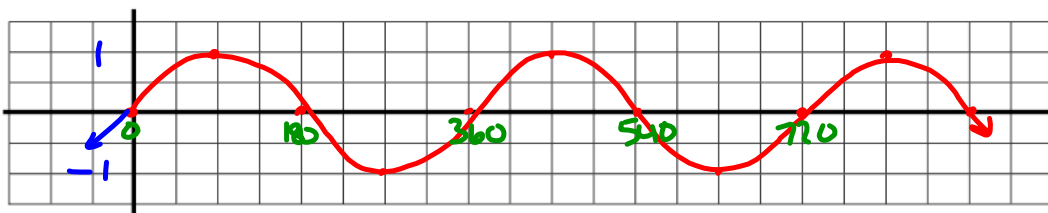


Table of Values

$$f(x) = \sin x$$

x	f(x)
0	0
90	1
180	0
270	-1
360	0
450	1
540	0

Key Features:

Amplitude	1
Period	360
Maximum	1
Minimum	-1
Equation of Axis (EoA)	$y = 0$
Domain	$\{x \in \mathbb{R}\}$
Range	$\{-1 \leq y \leq 1, y \in \mathbb{R}\}$

Now, look at the graph below, fill in the table of values and state the key features

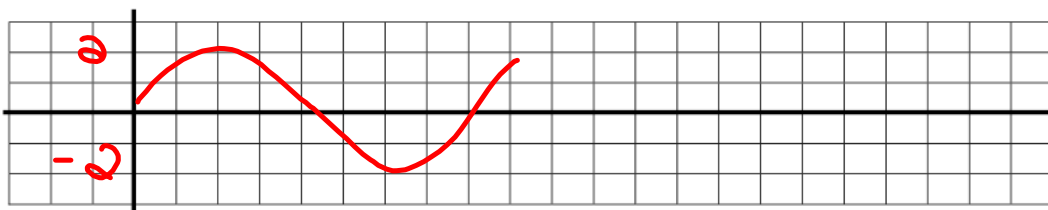


Table of Values

x	f(x)
0	0
90	2
180	0
270	-2
360	0
450	2
540	0

Amplitude	2
Period	360
Maximum	2
Minimum	-2
Equation of Axis (EoA)	$y = 0$
Domain	$\{x \in \mathbb{R}\}$
Range	$\{-2 \leq y \leq 2, y \in \mathbb{R}\}$

What does the equation look like? $y = 2 \sin x$

In function notation $f(x) = 2 \sin x$

What did we do to transform the original graph?

stretched vertically by a factor of (baf) 2

mapping
 $f(x) \rightarrow 2f(x)$

Again, look at the graph below, fill in the table of values and state the key features

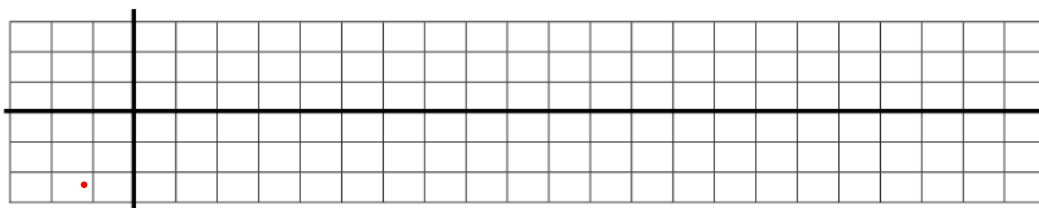


Table of Values

x	f(x)
0	
90	
180	
270	
360	
450	
540	

Amplitude	10
Period	360
Maximum	10
Minimum	-10
Equation of Axis (EoA)	$y = 0$
Domain	$\{x \in \mathbb{R}\}$
Range	$\{-10 \leq y \leq 10, y \in \mathbb{R}\}$

What does the equation look like?

$y = 10 \sin x$

In function notation

$f(x) = 10 \sin x$

What did we do to transform the original graph?

stretched vertically by 10.

$f(x) \rightarrow 10f(x)$

SUMMARY

A vertical stretch changes the MAX, MIN, Amplitude and range of $y = \sin x$.
We can say $f(x) = A \sin x$ where A is the AMPLITUDE.

CW: Sketch the following & list key features:

1.) $f(x) = 6 \sin x$

4.) $f(x) = 1.5 \sin x$

2.) $f(x) = 5 \sin x$

5.) $f(x) = \frac{8}{9} \sin x$

3.) $f(x) = 20 \sin x$